SWINE UPDATE

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Animal Sciences & Industry

Cross-fostering doesn't improve pig performance

by Malachy Young

Sibling competition is thought to have a major effect on pre-weaning piglet growth and survival. In the first few hours and days after birth, piglets compete aggressively for access to teats. Most piglets establish ownership of a particular teat; the others usually die, or survive by suckling opportunistically.

Management of low birth weight piglets is very important for the pig producer. Dead piglets are an obvious loss, but piglets with poor weight gains are also an important problem because they incur extra facility costs, produce less pork, and complicate management. Cross-fostering piglets between litters is a common practice aimed at improving survival and growth of piglets by equalizing the number of pigs per litter and minimizing weaning weight variation.

Researchers at McGill University conducted an experiment to study the effects of littermate weight on survival, weight gain, and suckling behavior of low birth weight piglets in cross-fostered litters of two different sizes. Piglets were ranked from heaviest to lightest, then fostered to create four treatments. They created small (8 or 9 piglets) or large (11 or 12 piglets) litter sizes and lightweight litters or "variable" litters.

In variable litters, low birth weight piglets were raised with much heavier littermates. In light litters, low birth weight piglets were raised with the next smallest pigs. As a result, the light litters had much lower variability in piglet weights after fostering.

Was weight gain of small pigs improved by creating "lightweight" litters? No! The lightweight pigs gained 8.5 lb during the 21-day lactation period when placed in a small litter with other lightweight pigs. The lightweight pigs gained 7.8 lb when placed in a large litter with other lightweight pigs.

However, when the lightweight pigs were placed in small or large litters with heavy pigs to create "variable" litters, they gained 9.0 and 8.3 lb, respectively. Cross-fostering to create consistent lightweight litters did not improve performance of the light weight pigs.

Was mortality reduced by having lightweight litters? Although the number of pigs in the trial was not adequate to fully test mortality, a slightly higher number of lightweight pigs died when reared with larger litter mates. However, overall mortality was not influenced by treatment. In other words, more lightweight pigs were saved by creating lightweight litters; but this was at the expense of other pigs that were fostered leading to no overall improvement in preweaning mortality.

Cross-fostering to create consistent light weight litters did not improve performance of the lightweight pigs.

Similar to previous results with nursery and finishing pigs, minimizing variability by grouping pigs by size does not improve pig performance. These researchers have demonstrated that aggressively moving pigs in the farrowing house to create lightweight litters of similar weight does not improve performance of the lightweight pigs.

Irradiated animal plasma improves nursery pig growth

by Joel DeRouchey

Kansas State University researchers have demonstrated that irradiation of spray-dried blood products improves growth performance of nursery pigs. Although not confirmed at this time, the reduction in bacteria or a deactivation of an antinutritional factor associated with these ingredients may contribute to the increased growth performance. Termin-8®, an antibacterial feed additive (formaldehyde based) produced by the Anitox Corporation, may provide another means for reducing bacteria in feed ingredients as well as the entire diet. However, the effects of Termin-8® have not yet been examined in diets for nursery pigs. Therefore, we conducted an experiment to determine the effects of irradiation of animal plasma or treatment of the animal plasma or whole diet with Termin-8® on nursery pig growth performance.

A total of 325 pigs (birth weight of 12.7 lb. and 17 ± 2 d of age) were used in a 14-day growth assay. Pigs were weaned, blocked by weight, and allotted to one of five dietary treatments. There were five pigs per pen and 13 pens per treatment.

Experimental diets were fed in meal form and formulated to contain 1.50% lysine, 0.90% Ca, and 0.80% P. Animal plasma was included in the diets at 5%. Treatment diets included the following: 1) Control diet with regular spray-dried plasma; 2) Control diet with irradiated plasma; 3) Control diet with Termin-8® treated plasma; 4) Control diet with Termin-8® treatment to the whole diet; 5) Treatment 2 with Termin-8® treatment to the whole diet.

Termin-8® application was provided at the FDA-approved level of 6 pounds per ton of total product (plasma or complete diet). Irradiation dosage used for the irradiated animal plasma treatments was 9.75 kGy. All individual ingredients used in the diets originated from similar lots. Thus, no influence of product variation should be present between treatments.

Overall on days 0 to 14, pigs fed diets containing irradiated plasma had greater ADG ($P < .05$), while pigs fed diets containing Termin-8®-treated plasma had improved ADG and ADFI ($P < .05$) compared to pigs fed the control and whole diets treated with Termin-8® (Table 1). Also, pigs fed the control diet tended ($P < .06$) to have greater ADFI than pigs fed the whole diet treated with Termin-8® that contained regular plasma. No differences in feed efficiency were observed between dietary treatments. Furthermore, Termin-8® treatment to the whole diet did not influence growth in this study, but numerical depressions in ADFI were evident.

Irradiation of spray-dried animal plasma eliminated all detectable bacteria, while the use of Termin-8® reduced the bacterial concentration by approximately one-half compared to non-treated spray-dried animal plasma. In addition, use of Termin-8® lowered the bacterial concentrations of the total diet compared to those not treated with Termin-8®.

We have completed additional research evaluating the effects of Termin-8® treatment of animal

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Table 1. Effects of Irradiation or Termin-8® of Plasma and/or Whole Diet on Weanling Pig Growth Performance

Item	Control	Irradiated Plasma	Termin-8® Plasma	Termin-8® Whole Diet	Termin 8® Whole Diet with Irradiated Plasma	SEM
day 0 to 14						
ADG, lb	.52[e]	.59[d]	.59[d]	.48[e]	.50[e]	.027
ADFI, lb	.62d[e]	.66[cd]	.70[c]	.55[e]	.56[e]	.029
F/G	1.20	1.12	1.20	1.14	1.14	.068
Aerobic Plate Count						
Plasma, CFU/g	1.8 x 105	0	9.1 x 104	1.8 x 105	0	
Whole diet, CFU/g	4.8 x 104	5.0 x 104	6.3 x 104	6.5 x 103	1.1 x 104	

[a]A total of 325 pigs (five pigs per pen and thirteen pens per treatment) with an average initial birth weight of 12.7 lb.
[b]Termin8" inclusion rate of 6 lb/ton of plasma or whole diet.
[cde]Means in same row with superscripts differ ($P < .05$).

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plasma or base mix (specialty protein products, milk products, ground oat groats, soy flour, flow agent, vitamins, and minerals) in commercial facilities. Similar improvements in growth performance of weanling pigs were detected for pigs fed diets containing Termin-8®-treated ingredients compared to a control diet with no ingredients treated with Termin-8®.

As previous research has shown, the use of irradiated animal plasma compared to its regular form improves growth performance in nursery pigs. Treatment of the animal plasma with Termin-8® provided an improvement in growth performance similar to irradiation. However, Termin-8® treatment to the whole diet did not improve nursery pig performance, and actually diminished the improvement seen when pigs were fed irradiated plasma.

Additional studies are needed to determine the appropriate amount of Termin-8® to apply to spray-dried animal plasma or the whole diet to achieve maximum growth performance in pigs. Finally, the way in which either irradiation or Termin-8® application to spray-dried animal plasma or base mix improves growth performance needs to be fully determined, although the reduction in bacteria appears to be an important factor.

Comparing menhaden fish meal sources in starter diets

by Malachy Young

Select menhaden fishmeal is used as a highly digestible protein source in diets for nursery pigs. Super Select menhaden fishmeal from Omega Proteins Corporation is one of the most common sources of fishmeal used in starter diets in the United States. If other sources of fishmeal were found to be as effective as Super Select, feed manufacturers and producers would have other options in diet formulations.

International Proteins Corporation recently started producing a menhaden fishmeal (IPC 740); however, no data is available on the feeding value for pigs. Therefore, our objective was to compare the effects of increasing levels of IPC 740 and Super Select menhaden fishmeal in starter diets.

One hundred and seventy five pigs (initially weighing 14.1 lb. and 17 ± 2 d of age) were used in a 21-day growth assay to compare the performance from two sources of menhaden fish meal (IPC and Super Select) at two different inclusion rates.

From day 0 to 14, ADG and F/G improved linearly ($P < .05$) as the level of fishmeal in the diet increased from 2.5 to 5%. There was no difference in performance between the two fishmeal sources (IPC or Super Select menhaden). In the third week of the trial, there was no benefit in adding fishmeal to the diet, as pigs on the control diet had similar ADG but significantly better F/G ($P<0.04$) than those fed the fish meal diets. At the end of week two, pigs fed the diets containing 5% fishmeal were 1 pound heavier than pigs fed the control diet. The weight advantage was maintained to the end of week three.

As expected, the best response to adding fishmeal to the diet was obtained for the first 14 days of the experiment, which coincides with the time when fishmeal would be fed in the field. There was no benefit to adding fishmeal during the last week of the experiment. This is not too surprising as the response to specialty protein sources declines with time post weaning.

This response illustrates the importance of phase feeding in the nursery. Once the benefit to complex protein sources is no longer evident, they should be removed from the diet. These results also indicate that IPC 740 and Super Select menhaden fishmeal can be used interchangeably in nursery pig diets.

Table 3. Effect of Source and Level of Fishmeal on Performance of Early Weaned Pigs

		IPC		Omega		P- Value	
	Control	2.5%	5%	2.5%	5%	Control vs Fish	IPC vs Omega
D 0 to 14							
ADG, lb	0.43	0.48	0.50	0.45	0.50	0.05	0.53
ADFI, lb	0.63	0.71	0.69	0.66	0.71	0.18	0.73
Feed/gain	1.50	1.49	1.39	1.48	1.43	0.44	0.76

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SWINE UPDATE

Swine Day

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